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# Q-HCOMPUTER PROJECT I:

Learning about computers



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4-H is for all young people ages 9 through 19. Young people in 4-H can choose from a wide range of educational activities and have fun while learning. Contact your county 4-H agent to learn how you can participate in the many projects and activities for young people.

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# 4-H Computer Project I:

## *Learning About Computers*

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### Introduction

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Welcome to the fascinating world of computers. Computers play an active role in everyone's life. Think about the things you do every day. You will soon realize that computers affect you directly in many ways. Banks, restaurants, department stores, toys, games and even automobiles use computers in some form.

As the field of computers continues to grow, there will be an increased need for people familiar with computer technology. The purpose of this project is to introduce persons with little or no computer experience to the fundamental operations of computers. There are two important points to remember while completing this project. First, there is nothing to fear about computers; computers will not fall apart because of the mistakes you make. Second, it will always take a human to operate a computer.

To begin, let's look at the functions of a computer.

- Perform complex, lengthy arithmetic operations quickly and accurately.
- Provide activities for entertainment and education.
- Remember and retrieve information.
- Make judgements for us by comparing stored facts.
- Sort data into meaningful information and statistics.
- Instantly balance checkbooks or inventory.
- Save businesses and individuals TIME, MONEY and SPACE.

### What You Will Learn in This Project

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- The basic parts of a computer and how they function together.
- The important KEYS on a keyboard.
- How to use a microcomputer as a calculator.
- How to run a simple tape or diskette program.
- How to take care of diskettes and cassette tapes.

### What You Will Do in This Project

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- Interact with a microcomputer.
- Use the computer as a calculator.
- Run prepared programs.
- Share what you have learned by giving a demonstration.
- Keep a record of your 4-H computer project.

### Understanding the Microcomputer

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Small, portable, low-cost computers that are used in the home or for small businesses are called microcomputers. The main features of popular microcomputers used in 4-H computer projects are shown in Figures 1 and 2. There are other similar types and models available.



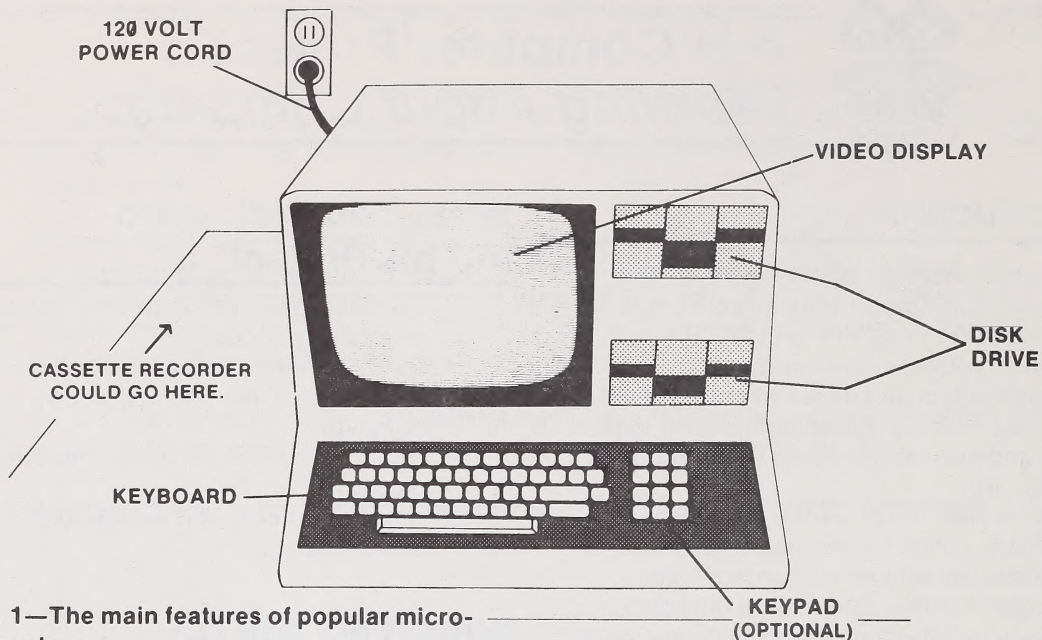


Fig. 1—The main features of popular micro-computers.

Fig. 2—Storage devices for microcomputers include cassette tapes (used with a cassette recorder) and diskettes.

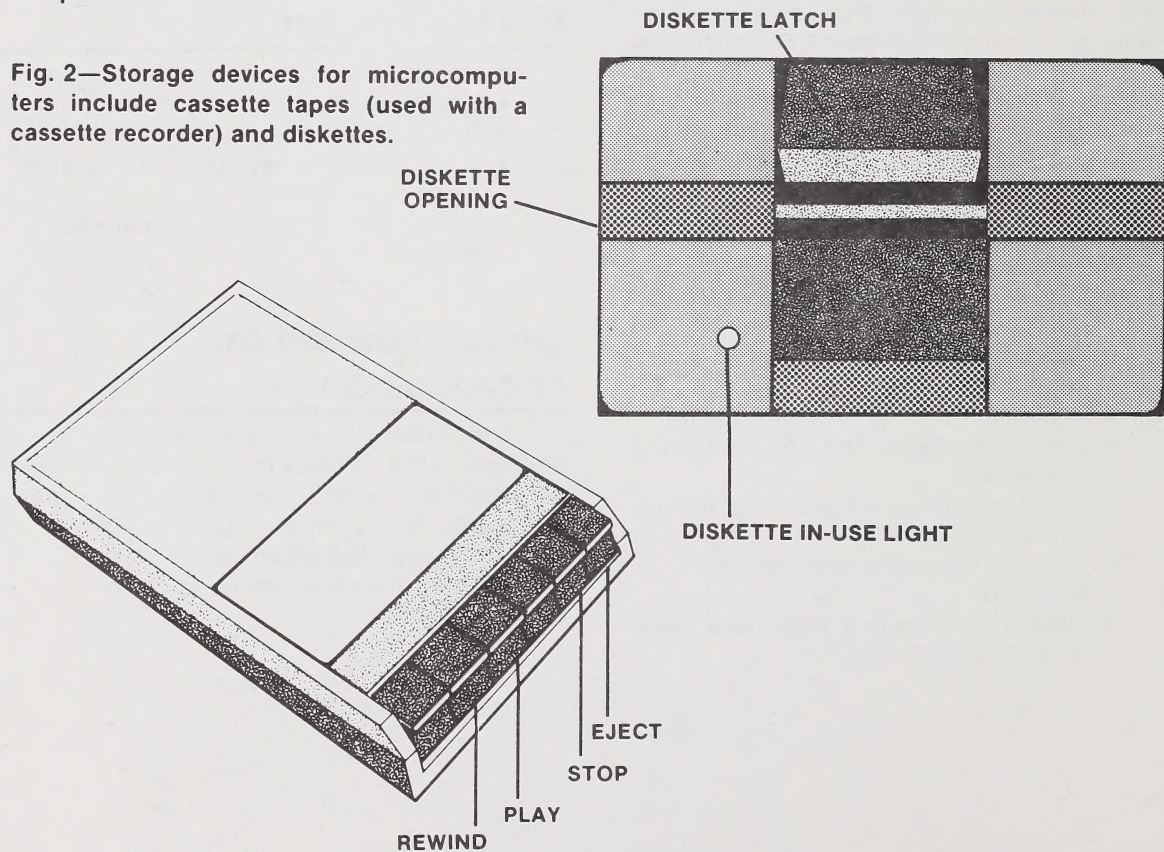
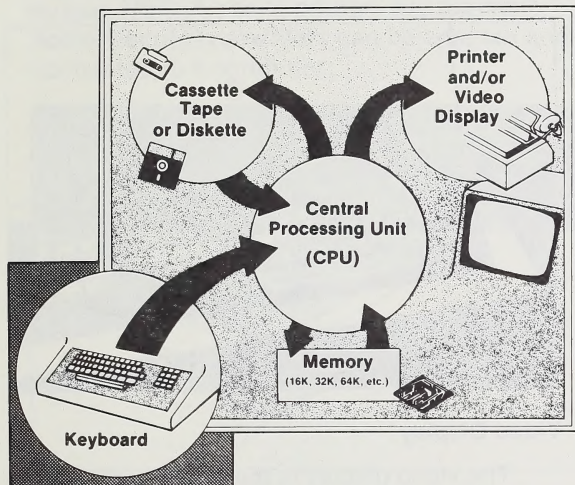




Figure 3 shows the parts of a micro-computer and how information is sent from one part to another. Study the figure closely. Understanding these parts is basic to understanding computers. Later in this project you will be asked to identify and label these parts.



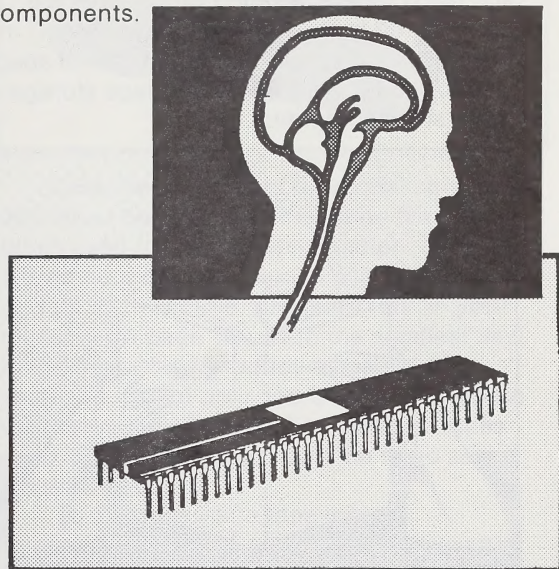
**Fig. 3.—The flow of information from one part of a microcomputer to another.**

## Components of a Computer

As shown in Figure 3 the basic components of the microcomputer include the central processing unit (CPU), memory, keyboard, video display, printer, and tape or diskette storage. These are typical of all computer systems. However, the larger the computer, the larger the devices and greater the number of keyboard, video, printer and storage devices that are connected to the central processing unit.

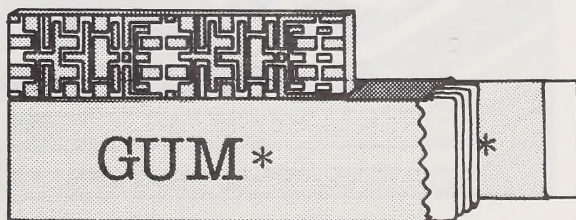
## Central Processing Unit (CPU)

The CPU is the "brain" of the computer. In microcomputers, the CPU is a complex integrated circuit called a microprocessor. It is located on the main control circuit board and receives, manipulates, and directs electrical signals to all the other computer components.



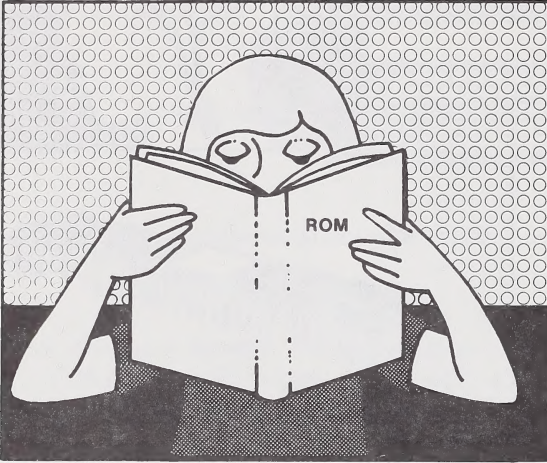
## Memory

In order for the CPU to perform useful work, a computer must have the ability to store information (or data). The ability to store data internally or within the computer is known as MEMORY. The memory section of the computer is composed of solid-state devices. One "chip" about  $\frac{1}{2} \times 2$  inches in size and  $\frac{1}{4}$ -inch thick with 16 to 32 terminal connections can act as a "memory" for 1K to 2K bytes. (Look up K and bytes in the glossary on page 16.) That's equivalent to a short written report in a package smaller than a five-stick package of chewing gum. Newer memory devices will have 10 to 100 times more capacity in the same space.

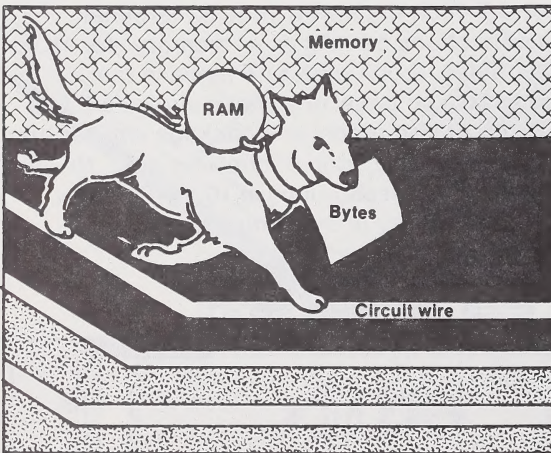




Memory can be ROM or RAM. ROM is Read-Only-Memory. The CPU can only ask for what's stored in ROM. ROM data cannot be changed. Special instruments, equipment and well trained people have permanently "stored" information in the ROM of your computer. The BASIC language instructions and many other operating procedures are often stored in the ROM. (Look up BASIC in the glossary on page 16.) About 12K of space is required for the BASIC language storage in many small computers.

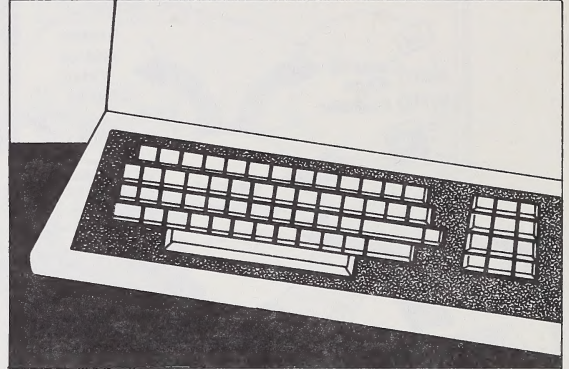


RAM is Random-Access-Memory. This is the memory that can be used to store information you type into the computer and "randomly" recall. That is, any byte of the memory is available for both storage and recall at any time. RAM is generally the add-on type (16K, 32K, 48K, etc., sizes).



## Keyboard

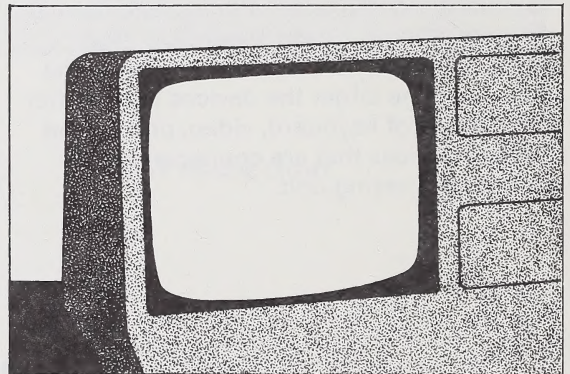
The keyboard is the tool you will use to communicate with the computer. The keyboard serves the functions of letting the operator select and construct instructions to enter into the computer and to type information and data for desired programs.



## Video Display

The video display is the direct opposite of the keyboard for it is the computer's means of "communicating" to the operator. The video display is a cathode ray tube (CRT) just like a black and white television that gives a visual display of the computer's output.

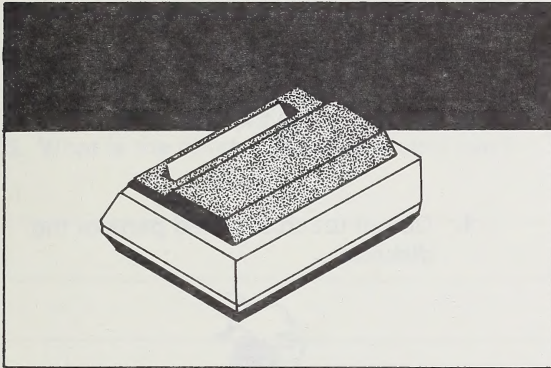
With special small electronic adapters and converters, any TV set can serve as a video display for the computer, but the quality is not as good as regular television viewing.





## Printer

In order to have permanent records of computer output, you must have a printer. With the video display, the computer output is visible only as long as you keep it on the screen. With a printer you can have a permanent printed copy of the computer output. Many types of printers are available. Some electric typewriters can be adapted and connected to a computer.

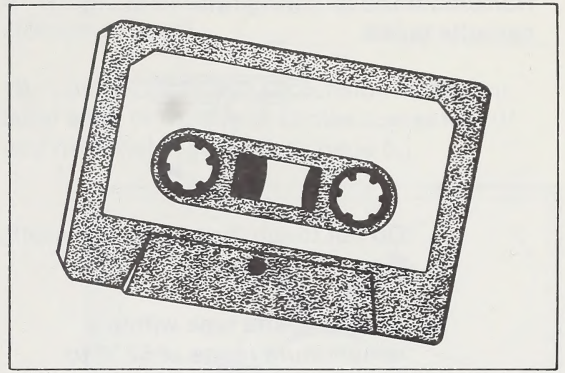


## Storage Systems

Many microcomputers use magnetic storage media for permanent external storage of data, programs and various types of files. There are a variety of different storage devices, but for this project you will be using either a cassette tape or a diskette.

### Cassette Tapes

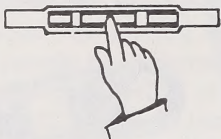
Cassette tapes are an economical method for the microcomputer to store information. These tapes have magnetic impulses that the computer is able to interpret. If you were to listen to the tape it would sound like "static" or a high-pitched tone but the computer can interpret this "static."



Cassette tapes used for digital computer data must be much better quality than the tapes used for music reproduction. Data are stored on a cassette tape at 500 to 1,500 bits of data each second. (Look up "bit" in your glossary on page 16.) Even the smallest flaw in the tape could produce a useless tape since the loss of only one bit would produce inaccurate information. The cassette tapes used with computers should be rated as "digital" quality.

To use a cassette tape with a microcomputer you must load the cassette into a tape recorder and the recorder must be connected to the computer. You will need to study the manual for the computer you will be using for instructions on how to use the cassette tape. Correct usage is absolutely vital to your success with the computer.

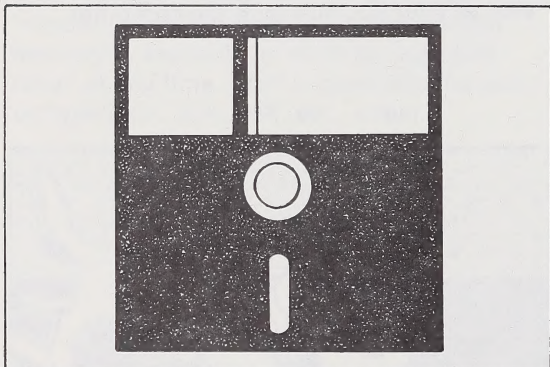
Remember the following rules in using cassette tapes:



1. Do not touch the exposed cassette tape.
2. Keep cassette tape within a temperature range of 52°F to 125°F.
3. Keep cassette tape away from electrical or magnetic fields.
4. Store cassette tape in a plastic box for protection from dust, dirt, etc.

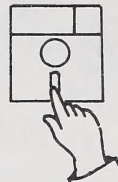
### Diskettes

Diskettes are similar to cassette tapes in that storage of information is performed magnetically. The difference is in the form. Diskettes are round, flexible disks that are magnetically coated. Diskettes have more storage capacity than cassette tapes. The diskettes come in 8-inch floppy diskettes and 5¼-inch mini floppies; even smaller floppies are now in development.



The diskette looks like a small phonograph record. It is inserted into a "slot opening" in the "disk drive," the small flap door is closed, and the computer is then ready to respond to your commands. Each computer has its own unique system; so you will need to study the manual for your computer to learn how to use the diskette.

Diskettes must be handled carefully or they will not operate correctly. Observe the following rules of use:



1. Do not touch exposed parts of the diskette.



2. Do not bend or crimp a diskette.
3. Keep diskette within a temperature range of 50°F to 125°F.
4. Keep diskette away from electrical or magnetic fields.
5. When inserting the diskette insert gently but fully into the drive position. Be sure the diskette label is positioned according to instructions for the computer you are using.
6. Store your diskette in a cover envelope to protect it from dust, dirt, etc.



## Let's Review

Try and answer these questions. If you have trouble, reread the section "Understanding the Microcomputer." Then try again.

1. What is MEMORY? \_\_\_\_\_

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2. Memory can be divided into two types: \_\_\_\_\_ and \_\_\_\_\_

3. What is the difference between the two? \_\_\_\_\_

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4. What part of the computer do you use to tell the computer what to do? \_\_\_\_\_

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5. The video display is the way the \_\_\_\_\_

communicates with you.

6. What is the printer's function? \_\_\_\_\_

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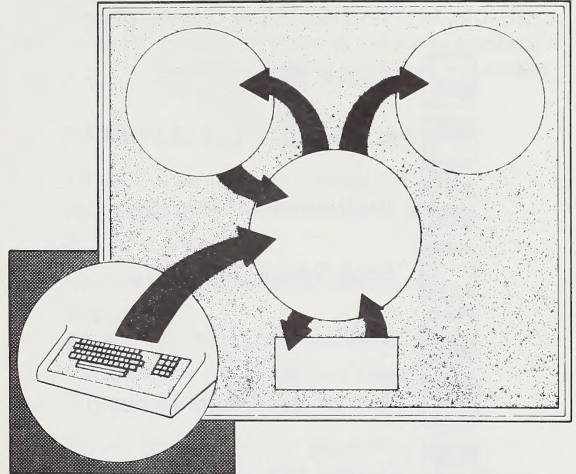
7. What part of the computer is its BRAIN? \_\_\_\_\_

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8. What does a computer use for internal storage of data? \_\_\_\_\_

9. What does a computer use for external storage of data? \_\_\_\_\_ and \_\_\_\_\_

10. Look at the illustration below. Can you label each of the blank circles correctly? (If you need help, go back to page 5.)



## Are You Ready?

If you have carefully read this booklet up to this point, you should be ready to interact with your computer. The keyboard is the first thing you start with.

The keyboard is important because it is the way you tell the computer what you want it to do. You should carefully study the basic keyboard keys in the following section. To operate the microcomputer properly, you need to know where each key is located on the keyboard and what each one does. Each brand of keyboard has different types of keys. To find more information on the keys for a specific machine, read the manual for your computer.



## The Keys of a Command Keyboard

You are now ready to learn the basic keys of most computers. The best way to get first-hand experience is to find the keys on your keyboard. Now, go to the computer, if one is available, and find each key on this page.



"Equal" (S)\*



"Subtraction" key



"Multiplication" key (S)\*



"Back Space" key



"Addition" key (S)\*



"Period" or "Decimal" key



"Divide" key



or



"Exponential" key



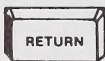
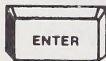
"Parentheses" key (S)\*



These are the numbers "one" and "zero" which are two of the 10 numbers on keyboard.



These are the letters "I" and "O" which are two of 26 letters on keyboard. Notice the difference between the two letters and two numbers.



"Enter" key or  
"Return" key



"Shift" key used with (S)\* keys



This is called the "space bar" key. If a blank is needed in a certain spot while typing, press the bar.

## Using the Keyboard

You, the operator, place information into the computer by typing on a keyboard. Follow the arrows in Figure 3 on page 5 to see how this information is distributed. The commands or instructions you type in or have sent in by the cassette tape or diskette cause the CPU to start working. The CPU sends the information to the MEMORY, where it is stored. Later, when you give the proper commands, the CPU gives you the results on the printer or the video display. Since the memory is limited in size and loses information stored in it when the power is turned off, the cassette tapes and diskettes are used for saving and storing information when not being used in the computer.

## Let's Review

1. What device sends data to memory to be stored? \_\_\_\_\_

2. What device is used to place human information into the computer? \_\_\_\_\_

## Using the Computer as a Calculator

Using the computer as a calculator is a good way to become familiar with your machine. It is one of the easiest operations for learning to use the computer. Find the manual or instructions that explain the computer you are using and read the steps for its proper use. If you have questions ask your leader.

\*(S) means you must press the shift key while pressing that key to produce the symbol desired.



## Math Symbols

Here are six math symbols used for calculations:

Symbol	Meaning	Example
+	Addition	$3 + 1 = 4$
-	Subtraction (minus or take away)	$6 - 2 = 4$
*	Multiplication (asterisk)	$3 * 2 = 6$
/	Division (slash)	$6 / 3 = 2$
↑ or ^	Exponentiation (raising a number to a power—Some machines will print a [ instead of a or but the computations will be the same.)	$2 \uparrow 3 = 8$ $3 \uparrow 2 = 9$ $2 \wedge 3 = 8$
( )	Parentheses (to enclose a group of computations)	$(3 + 2) = 5$

## Order of Operation or “Hierarchy”

When several math symbols (+, -, \*, /) are used, the computer uses a priority rule to do the computations. Here is how the computer will work, going from first to last priority.



Priority	Operation
1st ( )	Any combination enclosed in parentheses is solved first.
2nd ↑ or ^	Exponentiation is the second priority.
3rd * /	Multiplication and division are next priority.
4th + -	Addition and subtraction are done last.
5th L to R	For two or more of the same symbols together, computations are done from left to right.

**EXAMPLE:**  $2 * 5 + (3 * 4) - 3 \uparrow 2 = ?$

First, the computer solves the two numbers in the parentheses, that is:  
 $2 * 5 + (12) - 3 \uparrow 2 = ?$

Second, the computer solves the exponent:  
 $2 * 5 + 12 - 9 = ?$   
 (Notice the ( ) are not needed anymore.)

Third, the computer performs the multiplication and division moving from left to right:  
 $10 + 12 - 9 = ?$

Fourth, and finally, the computer does the addition and subtraction moving from left to right, to give the final answer:  
 $22 - 9 = 13$

## Doing Calculations on the Computer

Try these calculations on the computer. After you have a prompt symbol > or - (press the **ENTER/RETURN** key for it), tell the computer to calculate by typing **PRINT** and the computations you wish. Then press the **ENTER/RETURN** key. The computer shows the answer and the ready message. If an “error” message occurs, don’t get alarmed. Try again.

### Examples

1. Type: **PRINT 3 - 2**  
 Press: **ENTER/RETURN**  
 The computer responds: 1  
 The ready prompt will appear.



2. Type: **PRINT 3 \* 5**  
Press: **ENTER/RETURN**  
The computer responds: **15**  
The ready prompt will appear.
3. Type: **PRINT 3 ↑ 2**  
Press: **ENTER/RETURN**  
The computer responds: **9**  
The ready prompt will appear.
4. Type: **PRINT (3 \* 5)/(2 + 3)**  
Press: **ENTER/RETURN**  
The computer responds: **3**  
The ready prompt will appear.

Work the following problems in your head and place your answers in the column. Then let the computer work the problems and compare answers. (NOTE: Extra blank spaces before or after the math symbols may not cause any errors depending on the machine.) Remember to press **ENTER/RETURN** each time you wish the computer to do something.

Type	Your Answer	Computer's Answer
PRINT 5 * 40/10	_____	_____
PRINT 5 + 40/9	_____	_____
PRINT (50 + 50)/10	_____	_____
PRINT 10 + (20/4)	_____	_____
PRINT 4 * 2 ↑ 3	_____	_____
PRINT 1 ↑ 5	_____	_____
PRINT 3 ↑ 2 * 4	_____	_____
PRINT 2 + (3 * (2 ↑ 1))/3	_____	_____

The proper use of parentheses in mathematical statements is very important when using the computer. Look at the following example where we want to compute an answer of 6. Notice the answer is 6 if the parentheses are placed correctly. Without the parentheses the answer is 5.

**Example:**  $2 * 2 + 1 = 5$   
 $2 * (2 + 1) = 6$

Now try this problem. Revise the mathematical statement below to compute an answer of 15. Do this by putting the parentheses in the right places. Remember the order of hierarchy.

$$1 * 6/2 * 9 - 4 * 1$$

Now that you have put the parentheses where you think they should go, enter the equation into the computer (remember to put a **PRINT** statement before your equation) and check your answer.

Try some more examples on your own. There is a limit on the size of numbers you can use and how many consecutive computations you can put on one line. As you learn more about the computer, you will learn these limits. Just keep it simple for now.

Your Examples	Computer's Answers
_____	_____
_____	_____
_____	_____
_____	_____

If you would like some words in the answer, try the following procedure using quotation marks and a semicolon.

Type: **PRINT "THE ANSWER IS"; 4 + 5**

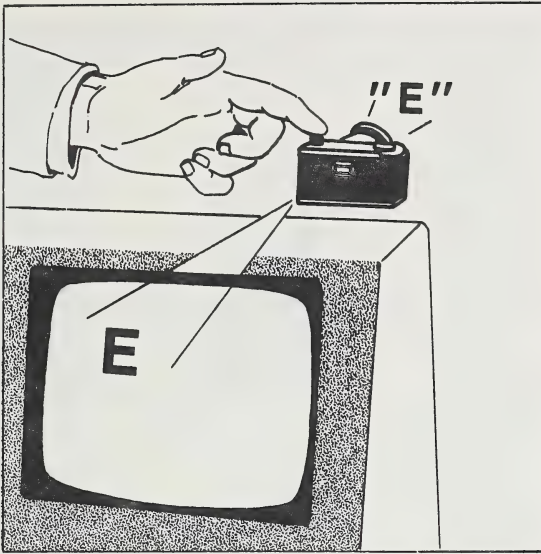
Press: **ENTER/RETURN**

The computer will show: **The ANSWER IS 9**

You can put whatever words or symbols you wish between the quotation marks. Always be sure to put the semicolon in the position shown.

Think of the **PRINT** statement as a camera. The information you are "photographing" is what you are printing. Your end result is a reproduction of the desired information.





Put your name in quotes and your age after the semicolon. Watch the information appear on the screen. Now try two examples on your own.

**Your Examples**

**Computer's Answers**

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## Let's Review

The computer "understands" in a way that is different from human understanding. Many humans will think that the answers to these arithmetic problems are the same. Try them on the computer.

**1. PRINT  $10 + 20 / 4$**

Your answer = \_\_\_\_\_

Computer's answer = \_\_\_\_\_

**2. PRINT  $(10 + 20) / 4$**

Your answer = \_\_\_\_\_

Computer's answer = \_\_\_\_\_

If you did not get the same answer, why?  
(Think about hierarchy or order of operations.)

**3. How will the computer solve this problem?**

**PRINT  $5 * 3 \uparrow 2 + (10 - 4)$**  \_\_\_\_\_

First operation the computer will solve = \_\_\_\_\_

Second operation the computer will solve = \_\_\_\_\_

Third operation the computer will solve = \_\_\_\_\_

ANSWER = \_\_\_\_\_

## Learning More About What's Inside the Black Box

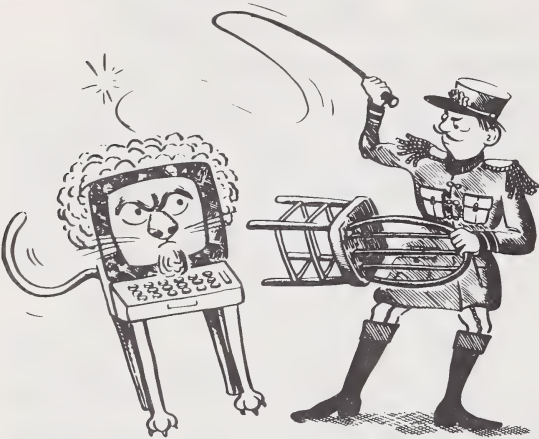
What happens inside the "black box" of the computer deserves a brief summary. This material should give you some insight as to how a computer works so you can better understand the computer and be prepared to read other manuals and publications on computers.

To start with, you must realize that a computer is not a "thinking" machine, nor does it have any "magical" capabilities. The computer must be "instructed" on every step it makes. Everything a computer does has been predetermined by a human. This is called "programming." The computer's main characteristics are SPEED and PRECISION. It can also store information, although storage capabilities are limited at this time. Enormous storage capabilities are now becoming possible, and soon programming can enter a new dimension.



## The “Program” or “Your Orders”

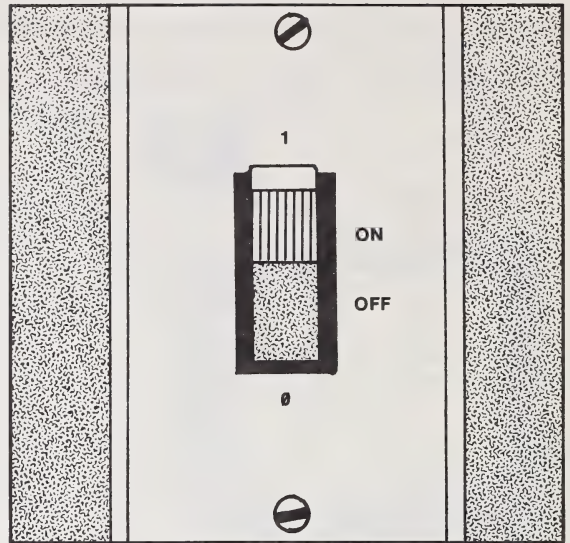
A computer “program” is a set of instructions prepared by a person who directs the computer to do desired calculations, information sorting, or word processing. It is necessary that the computer be programmed in the desired sequence. The word “sequence” means that your program or directions to the CPU must be written so that the operations logically follow one another.



## Bits and Bytes

Being an electrical device, the computer recognizes only two electrical conditions—ON or OFF; that is, a positive or negative charge, or the presence or absence of a voltage. A one (1) and a zero (0) are used to denote these two conditions. All *letters, numbers, symbols, etc.*, used in a computer are represented by one’s and zero’s. This is called a “binary” system (meaning two parts). Each electrical signal representing a one or zero is referred to as a bit from the words Binary digiT. For most small computers, eight bits are used to represent each number, letter, character, etc. (Some new “small” computers and all large computers use 16 or 32 bits.) These eight bits together are called a byte.

The memory and operating capacity of a computer is expressed in terms of thousands of bytes with K representing 1,000. Thus, for example, 16K size means that the internal memory is capable of receiving, storing and manipulating approximately 16,000



characters (letters, numbers, “spaces,” symbols, etc.). The microcomputers are expandable to 32K, 48K, 64K and even greater internal memory. For many games and personal uses, 16K or 32K may be adequate. However, for business uses, 48K or 64K is necessary and even larger is preferable. External “diskette” storage devices can add large amounts of readily accessible storage “memory.”

The large institutional or corporate computers will have millions of bytes of available internal memory and virtually unlimited external storage and usable “memory” in the form of 12-inch magnetic disks and/or 1-inch wide by 12-inch diameter rolls of magnetic tape. Access of data on disks is very fast whereas tape is rather slow if the equipment has to unroll several hundred feet of tape to find the desired data.

## Let’s Review

1. A \_\_\_\_\_ must instruct a computer to do everything it does.
2. What is a computer program? \_\_\_\_\_



3. What are the two numbers that represent ON and OFF in the binary system? \_\_\_\_\_

4. What does "K" represent in computer talk? \_\_\_\_\_

## Using Cassette Tapes and Diskettes to Run Programs

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Now that you have become familiar with the computer by doing the mathematical computations you are ready to "run programs."

Be sure to observe all the rules for taking care of the cassette tapes and diskettes. (See page 8 if you need to refresh your memory.) If you are learning about computers with a group, your leader or instructor will have cassette tapes or diskettes for you to use, or you may already have your own cassette tapes or diskettes.

If you are not familiar with the proper operation of microcomputers, then refer to separate instructions or the manuals on how to operate a microcomputer and how to use the cassette tapes or diskettes. Your next step is to load the diskette or cassette tape and start the program running. Your program will ask you many questions and tell you how to answer them. Choose your best answer and enter it properly into the microcomputer.

Now, press **ENTER/RETURN**. Follow all the instructions and remember to press **ENTER** or **RETURN** each time you wish the computer to do something. Good luck!

## For More Information

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- Read the instruction manual that accompanies the microcomputer that you have been using. This is one of the best sources for extra information.

- Ask your local gas, electric and water companies if their records are computerized and how they use computers to do work. Take a group tour, if possible. Ask about careers related to the computer.
- Check with your principal to see if any computers are used at your school. Ask to see these at work. Find out how computers help with the administrative work of the school.
- Ask your parent if his/her company uses computers. Find out how.
- Get university, college, or technical school bulletins. Find out what degrees they give in computer science.
- Ask your counselor how you can prepare yourself for a career with computers.

## Demonstrations and Illustrated Talks

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Give a demonstration or illustrated talk on computers to help others learn.

- Demonstrate how to load and unload a diskette or cassette tape and how to care for it.
- Show how to use the computer to run a complicated mathematical computation.
- Research computer science careers and tell what you have learned to your 4-H group or any group.
- Give an illustrated talk on what goes on "Inside the Black Box."



# Glossary

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The definitions below introduce you to selected computer terms. Many of these words are used in this project book. However, the glossary also contains a few additional words not mentioned in this project to broaden your knowledge of computer terms. Scan the glossary for words that you don't understand and read the definitions carefully.

**BASIC**—Beginners All-purpose Symbolic Instruction Code, a simplified “language” using numerous common English words as commands and instructions to tell the microcomputer what to do.

**BAUD**—Denotes the rate of signal transfer in bits per second. Three hundred baud is approximately 63 characters/second. The typical baud is 300, but it may range up to 600 or 1,200.

**BIT**—The basic electronic signal, “voltage” or “no voltage” condition (ON or OFF), to which all information is coded.

**BYTE**—Refers to a certain number of bits (8 for most microcomputers) grouped together to represent coded numbers, letters, characters, etc.

**COMPUTER**—A machine that performs high-speed data calculations and manipulates data according to a set of coded instructions.

**DISKETTE**—Generally refers to a “floppy” diskette used with microcomputers to store software and data outside the “memory.” Two sizes are standard at this time: 5¼- and 8-inch diameter. Other sizes are possible in the future.

**DISK DRIVE**—The hardware item that receives the floppy diskette and enables recording and reading of the information between the microcomputer and diskette.

**HARDWARE**—The microcomputer equipment, including all input and output devices (disk drives, printers, etc.).

**HIGH-LEVEL LANGUAGES**—Powerful languages that have to be transformed to machine language for the computer to use. Languages, such as BASIC, FORTRAN, COBOL, PASCAL, PL/1, etc., are high-level languages.

**K**—Stands for approximately 1,000 bytes.

**KEYBOARD**—The means of human communication with the microcomputer.

**MACHINE LANGUAGE**—The number and letter codes that the electronics of the microcomputer “understands.” It is concise and fast. Machine language is the high-level language converted for the computer to understand.

**MEMORY**—The electronic components in the microcomputer that receive, store, and allow recall of computer-related information.

**MODEM**—The electronic device that interfaces the microcomputer to the telephone for transfer of software, data, etc., with electrical signals.

**PRINTER**—A device for producing a hands-on, readable copy of results from the computer. There are several makes and models of printers available.

**PROGRAM**—A set of instructions or steps telling the computer how to handle a problem or task.

**RAM**—Acronym for **R**andom-**A**ccess-**M**emory. Known as the main or internal memory. This memory is built into microcomputers for your software.

**ROM**—Acronym for **R**ead-**O**nly-**M**emory. Another form of internal storage not available to the user. This memory is specifically used for built-in programs.

**SOFTWARE**—The series of instructions loaded into the computer's internal memory that commands the computer on how to accomplish a problem or task, e.g., a program.

**VIDEO DISPLAY**—The “screen,” technically a cathode ray tube (CRT).

# Answers to Review Questions

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## Let's Review, page 9.

1. The ability to store data internally or within the computer.
2. RAM and ROM
3. ROM (Read-Only-Memory) data cannot be changed; RAM (Random-Access-Memory) data can be typed into the computer and can be randomly recalled.
4. Keyboard
5. Computer
6. Gives you a permanent copy of the computer output.
7. CPU
8. Memory
9. Cassette tapes and diskettes

## Let's Review, page 10.

1. CPU
2. Keyboard

## Let's Review, page 14.

1. Human
2. A set of instructions prepared by a person who directs the computer to do desired calculations, information sorting or word processing.
3. 1 and 0
4. 1,000







## 4-H Computer Project I: *Learning About Computers*

### PROJECT RECORD FORM

Name \_\_\_\_\_ School \_\_\_\_\_

County \_\_\_\_\_ Birth Date \_\_\_\_\_

Name of 4-H Club/Group \_\_\_\_\_ Today's Date \_\_\_\_\_

- A. Tell what you learned in this project (for example, learned how to operate the keyboard of a microcomputer).

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- B. List any activity related to this project in which you participated, such as group meetings, tours, exhibits, demonstrations.

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- C. List any awards or recognition you have received in this project.

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- D. If you helped others with their computer project, give the number of people you helped and what you did to help them.

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- This image shows a single sheet of cream-colored paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

**Alberta**  
AGRICULTURE  
4-H BRANCH